SHEET INDEX

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SHEET INDEX OPTION INDEX SUPPORTING INFORMATION	1	A1	16
FS1(MFR DISC) CONTROL CIRCUIT FS2 AMPLIFIER DETECTOR CIRCUIT (MFR DISC)	2	B1	16
FS3(MFR DISC) LOOP CUT-THROUGH KEY CIRCUIT FS4(MFR DISC) LOOP TERMINATING KEY CIRCUIT	3	B2	16
FS5 CONTROL CIRCUIT	--	B3	16
APP FIG.1(MFR DISC) APP FIG. 2 (MFR DISC) APP FIG. 3(MFR DISC) APP FIG. 4(MFR DISC)	4	C1	16
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	--	03	16
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CIRCUIT REQUIREMENTS	6	F1	16
CAO 1 (MFR DISC) CAO 2	--	G1	16
CPS1 & 1A	---	J1A	16
		J1B	16

CONTENTS	SHEET NO.	ISSUE NO.

OPTION INDEX	
APP OR WAS	LOCATION
Z	2C3
Y	2C3
X	2F1,3A1
W	2F1,3A1
V	APP FIG. 2
U	APP FIG. 2

DIRECT CURRENT DRAIN

NOMINAL VOLTAGE	CURRENT
48 VDC	.055 -.075 AMPS

SHEET INDEX NOTES
1. WHEN CHANGES ARE MADE IN THIS DRAWING, ONLY THOSE SHEETS AFFECTED WILL BE REISSUED.
2. THIS SHEET INDEX WILL BE REISSUED AND BROUGHT UP TO DATE EACH TIME ANY SHEET OF THE DRAWING IS REISSUED, OR A NEW SHEET IS ADDED.
3. THE ISSUE NUMBER ASSIGNED TO A CHANGED OR NEW SHEET WILL BE THE SAME ISSUE NUMBER AS THAT OF THE SHEET INDEX.
4. SHEETS THAT ARE NOT CHANGED WILL RETAIN THEIR EXISTING ISSUE NUMBER.
5. THE LAST ISSUE NUMBER OF THE SHEET INDEX IS RECOGNIZED AS THE LATEST ISSUE NUMBER OF THE DRAWING AS A WHOLE.

SUPPORTING INFORMATION	
CATEGORY	NO.

NOTICE
NOT FOR USE OR DISCLOSURE OUTSIDE THE BELL SYSTEM EXCEPT UNDER WRITTEN AGREEMENT

ISSUE 168

1N99

COMMON SYSTEMS

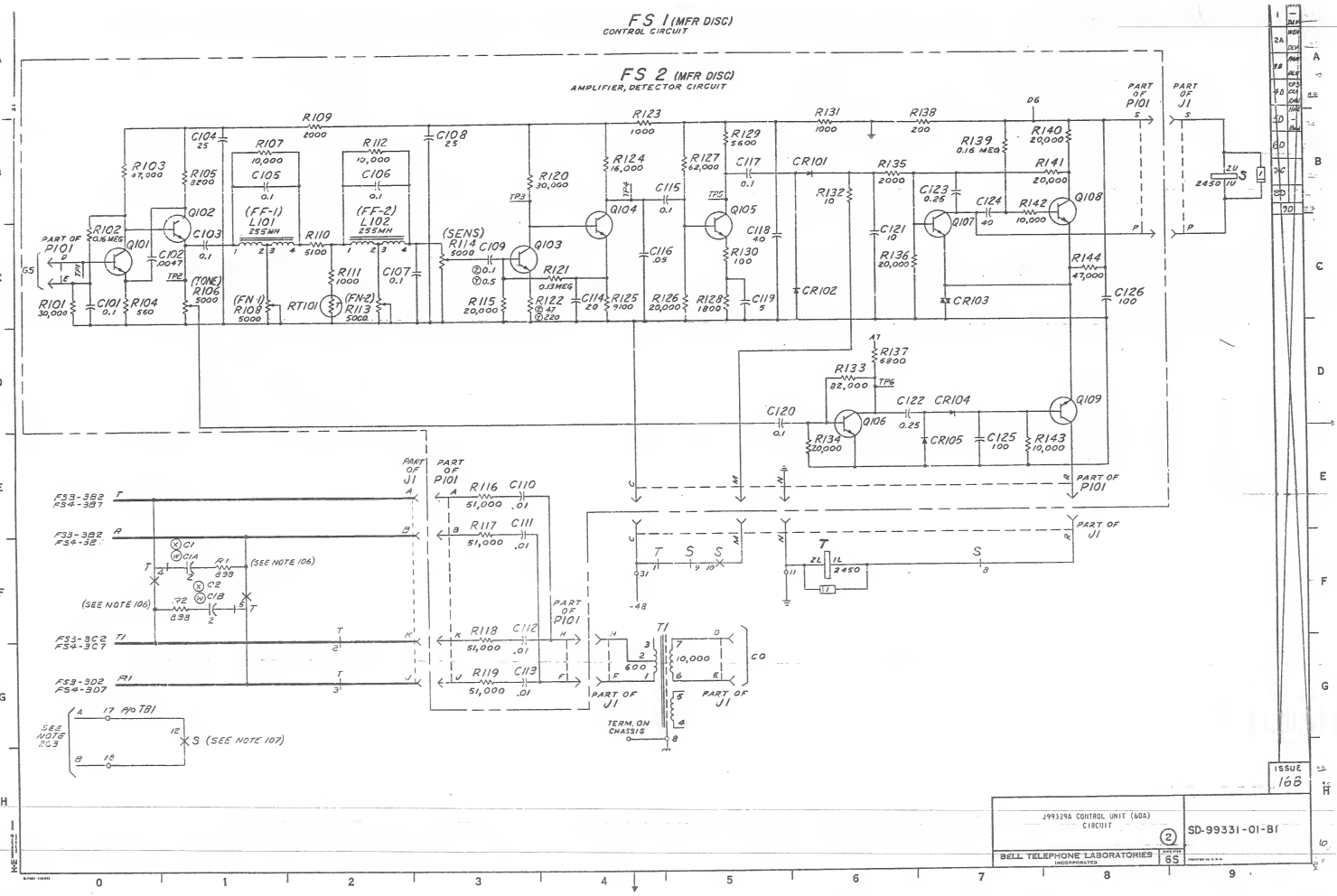
J99329A CONTROL UNIT (6QA1) CIRCUIT

AT&TCO STANDARD

BELL TELEPHONE LABORATORIES INCORPORATED

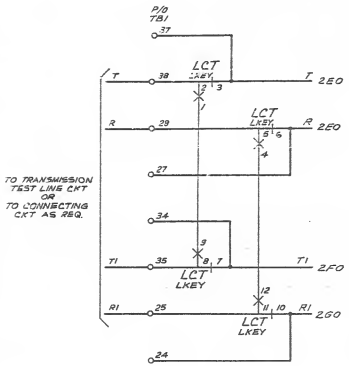
SD-99331-01-A1

14 SHEETS


FS 1 (MFR DISC)
CONTROL CIRCUIT
FS 2 (MFR DISC)
AMPLIFIER, DETECTOR CIRCUIT
R109 2000
R123 1000
R131 1000
R138 200
C104 25
C108 25
R103 47,000
R105 3200
R107 10,000
C105 0.1
(FF-1) L101 255MH
R112 10,000
C106 0.1
(FF-2) L102 255MH
R120 30,000
R124 16,000
R127 62,000
R129 5600
C117 0.1
CR101
R135 2000
R139 0.16 MEG
R140 20,000
R141 20,000
PART OF P101
PART OF J1
2450
R102 0.16 MEG
Q102
C103 0.1
R110 5100
(SENS) R114 5000
C109 0.1
0.5
Q103
R121 0.13MEG
C115 0.1
Q104
C116 .05
Q105
C118 40
R130 100
R132 10
CR102
R136 20,000
C121 10
C123 0.25
Q107
C124 40
R142 10,000
Q108
R144 47,000
C126 100
CR103
PART OF P101
Q101
C102 .0047
R101 30,000
C101 0.1
R104 560
(TONE) R106 5000
R111 1000
C107 0.1
(FN 1) R108 5000
RT101
(FN 2) R113 5000
R122 47 220
R115 20,000
C114 20
R125 9100
R126 20,000
R128 1800
C119 5
R137 6800
R133 82,000
C120 0.1
Q106
C122 0.25
CR104
CR105
C125 100
R134 20,000
R143 10,000
Q109
PART OF J1
PART OF P101
FS3-3B2 FS4-3B7
FS3-3B2 FS4-3B2
C1 C1A R1 498 (SEE NOTE 106)
C2 C1B R2 498 (SEE NOTE 106)
FS3-3C3 FS4-3C7
FS3-3D2 FS4-3D7
R116 C110 51,000 .01
R117 C111 51,000 .01
R118 C112 51,000 .01
R119 C113 51,000 .01
PART OF P101
T1
600
10,000
CO
PART OF J1
TERM. ON CHASSIS
PART OF J1
SEE NOTE 3C3
17 TO T81
S (SEE NOTE 107)
PART OF J1
PART OF J1
-48
ISSUE 16B
J993298 CONTROL UNIT (60A) CIRCUIT
SD-99331-01-81
BELL TELEPHONE LABORATORIES INCORPORATED
6S

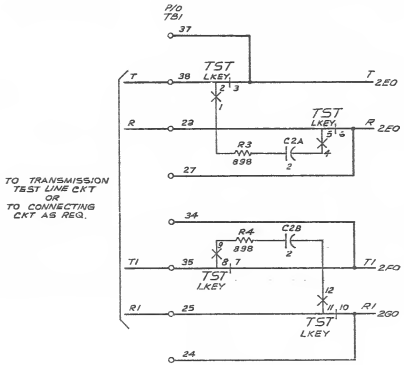
⊗ FS 3 (MFR DISC)

LOOP CUT-THROUGH KEY CIRCUIT



Ⓦ FS 4 (MFR DISC)

LOOP TERMINATING KEY CIRCUIT



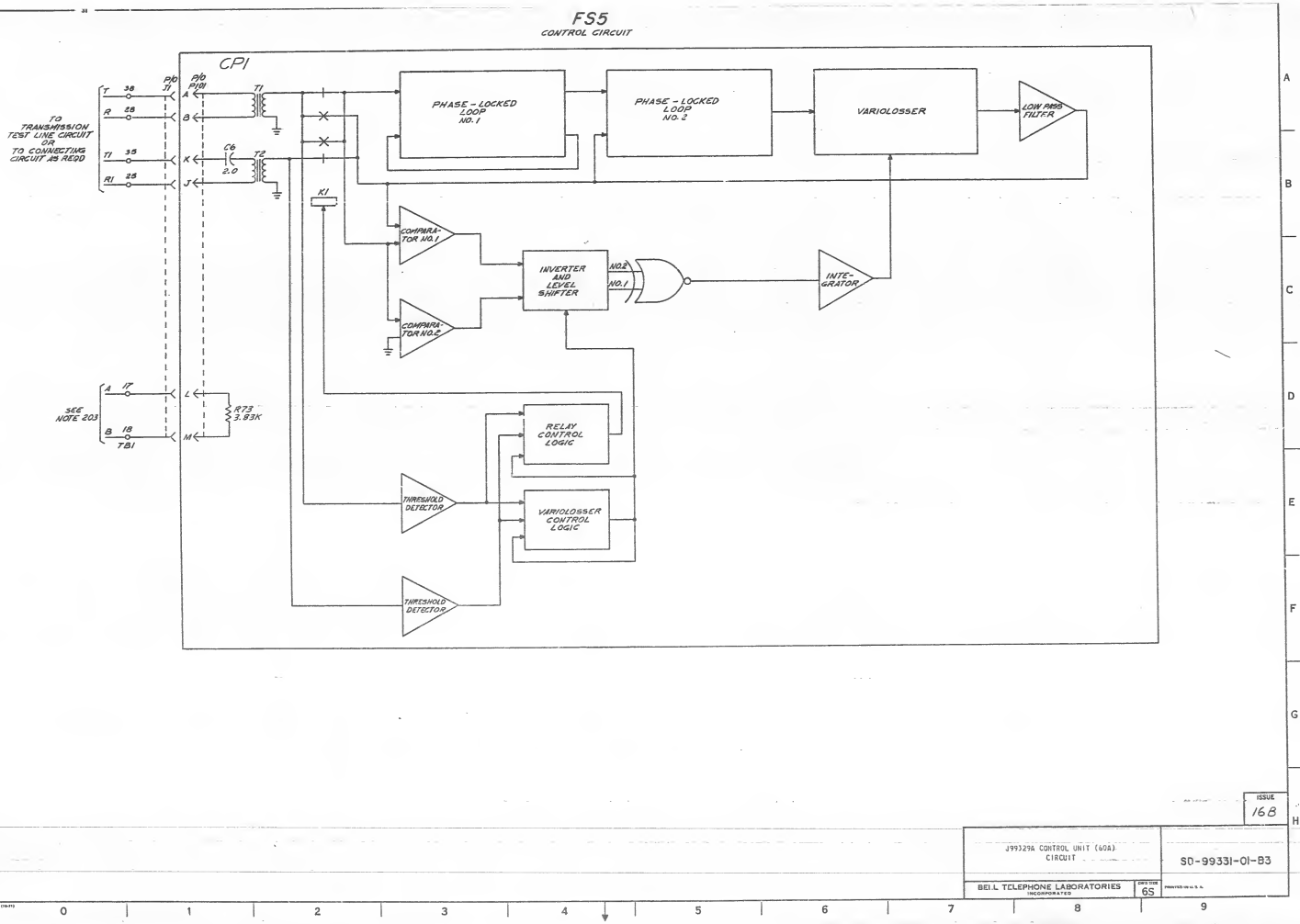
ISSUE 168

J99329 CONTROL UNIT (604) CIRCUIT

SD-99331-01-B2

BELL TELEPHONE LABORATORIES INCORPORATED

SIZE AND DWG NO. 65


FS5
CONTROL CIRCUIT
CP1
TO TRANSMISSION TEST LINE CIRCUIT OR TO CONNECTING CIRCUIT AS REQD
T 38
R 28
T1 35
R1 25
P/O J1
P/O P101
A
B
K
J
T1
C6 2.0
T2
K1
PHASE - LOCKED LOOP NO. 1
PHASE - LOCKED LOOP NO. 2
VARIOLOSSER
LOW PASS FILTER
COMPARATOR NO.1
COMPARATOR NO.2
INVERTER AND LEVEL SHIFTER
NO.2
NO.1
INTEGRATOR
SEE NOTE 203
A 17
B 18
TB1
L
M
R73 3.83K
RELAY CONTROL LOGIC
THRESHOLD DETECTOR
VARIOLOSSER CONTROL LOGIC
THRESHOLD DETECTOR
ISSUE 168
J99229A CONTROL UNIT (60A) CIRCUIT
SD-99331-01-B3
BELL TELEPHONE LABORATORIES INCORPORATED
DRG SIZE 6S

APP FIG. 1 (MFR DISC)

RELAY

DESIG	S		T						DESIG
CODE	8X33								CODE
OPTION									OPTION
CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC	CONT ARR	LOC		
12	M	2H1							12
11	M								11
10	H	2F5							10
9	B	2F5							9
8	B	2F7							8
7									7
6									6
5			E8N	2F1					5
4		X	E8M	2F0					4
3			E8	2G2					3
2		/	E8	2G2					2
1			E8M	2F9					1
COIL		2B9		2F6					COIL

CONNECTOR

DESIG	J1
CODE	KS-16345, L2 SOCKET
OPTION	
TERM	
S	2B8
R	2F8
P	2C8
N	2E6
M	2E5
L	
K	2F3
J	2G3
H	2F4
F	2G4
E	2G5
D	2F5
C	2E4
B	2E3
A	2E3

TERMINAL BOARD

DESIG	TB1					
CODE	034					
OPTION						
TERM	LOC	TERM	LOC	TERM	LOC	
11	2F6	21		31	2F4	
12		22		32		
13		23		33		
14		24	a	34	e	
15		25	b	35	f	
16		26		36		
17	2G6	27	c	37	g	
18	2H0	28	d	38	h	

(X) 101	(X) 3C1		
a (M) 306	e (M) 3C6		
(X) 101	(X) 3C1		
b (M) 306	f (M) 3C6		
(X) 381	(Z) 387		
c (M) 386	g (M) 386		
(Z) 381	(Z) 387		
d (M) 386	h (M) 386		

CAPACITOR

DESIG	LOC	CODE
(X) C1	2F1	439A,2
(X) F2	2F1	439A,2
(X) C1A	2F1	437C,2
(X) C1B [1]	2F1	

NETWORK

DESIG	LOC	CODE
S	2B9	185A
T	2F6	185A

RESISTOR

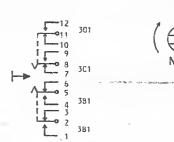
DESIG	LOC	CODE
R1	2F1	221A,898
R2	2F1	221A,898

TRANSFORMER

DESIG	LOC	CODE
T1	2F4	2536H

(X) APP FIG. 3 (MFR DISC)

KEY	KEYTOP
LCT	597A



APP FIG. 2 (MFR DISC)

ED-99653-31 (SEE NOTES 1 & 2)

CAPACITOR

DESIG	LOC	CODE
C101	2C0	542L
(Y) C102	2C1	KS-20300L8,4700pF
(Z) C102	2C1	65P47292, 5PRAGUE
C103	2C1	542L
C104	2B1	KS-16390,L1
C105	2B1	5708M
C106	2B2	5708N
C107	2C2	542L
C108	2B3	KS-16390,L1
C109	2C3	(Z) 542L, (Y) 542A
C110	2E3	542S
C111	2E3	542S
C112	2F3	542S
C113	2J3	542S
C114	2C4	KS-16390,L4
C115	2B5	542L
C116	2C4	542M
C117	2B5	542L
C118	2C5	KS-16390,L8
C119	2C5	601A
C120	2D5	542L
C121	2C6	601B
C122	2D6	542C
C123	2B7	542C
C124	2B7	KS-16390,L8
C125	2E7	602B
C126	2C8	KS-19658,L6

CONNECTOR

DESIG	P101
CODE	KS-16345, L1 PLUG
OPTION	
TERM	LOC
S	2B8
R	2F8
P	2F8
N	2E6
M	2E5
L	
K	2F3
J	2G3
H	2F4
F	2G4
E	2C0
D	2C0
C	2E4
B	2E3
A	2E3

DIODE

DESIG	LOC	CODE
CR101	2B6	400J
CR102	2C6	
CR104	2D7	
CR105	2E7	

INDUCTOR

DESIG	LOC	CODE
L101	2C1	1586L
L102	2C2	1586L

POTENTIOMETER

DESIG	LOC	CODE
R106	2C1	50000 CHICAGO TELEPHONE SUPPLY RV5LAR5B5A24
R108	2C1	
R113	2C2	
R114	2C3	

RESISTOR

DESIG	LOC	CODE
R101	2C0	30,000Ω
R102	2C0	0.16 MEG
R103	2B0	47,000
R104	2C0	5600
R105	2B1	82000
R107	2B1	10,0000
R109	2B2	20000
R110	2C2	5100Ω
R111	2C2	10000
R112	2B2	10,0000
R115	2C3	20,000Ω
R116	2E3	51,3000
R117	2E3	51,0000
R118	2F3	51,0000
R119	2G3	51,0000
R120	2B4	30,0000
R121	2C4	0.13MEG
R122	2C4	(Z) 470, (Y) 220Ω
R123	2B4	10000
R124	2B4	16,0000
R125	2C4	91000
R126	2C4	20,0000
R127	2B5	62,0000
R128	2C5	18000
R129	2B5	56000
R130	2C5	1000
R131	2B6	10000
R132	2B6	100
R133	2D6	82,0000
R134	2E6	20,0000
R135	2B6	20000
R136	2C6	20,0000
R137	2D6	68000
R138	2B7	2000
R139	2B7	0.16 MEG
R140	2B8	20,0000
R141	2B8	28,0000
R142	2B7	10,0000
R143	2E7	10,0000
R144	2C8	47,0000

ALLEN BRADLEY CB,±5%

THERMISTOR

DESIG	LOC	CODE
RT101	2C2	178

TRANSISTOR

DESIG	LOC	CODE	
Q101	2C0	16F	66F
Q102	2B1	16F	66F
Q103	2C4	16F	66F
Q104	2B1	16F	66F
Q105	2B5	(Y) 16F	(U) 66F
Q106	2D6	16F	66F
Q107	2C7	16K	66K
Q108	2B8	16F	66F
Q109	2D8	16K	66K

VARISTOR

DESIG	LOC	CODE
CR103	2C6	100A

(U) APP FIG. 4 (MFR DISC)

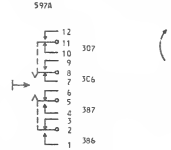
CAPACITOR

DESIG	LOC	CODE
C2A	3B6	437C,2
C2B	3C6	

RESISTOR

DESIG	LOC	CODE
R3	3B6	221A,898
R4	3C6	221A,898

KEY	KEYTOP
TST	597A



NOTES:

1. PRIOR TO ISSUE 40 ED-99653-30 WAS A-152907.
2. PRIOR TO ISSUE 118 ED-99653-31 WAS ED-99653-30.

J99329A CONTROL UNIT (60A) CIRCUIT	SD-99331-01-CI
BELL TELEPHONE LABORATORIES INCORPORATED	SHEET NO. 65

ISSUE 168

APP FIG. 5

CIRCUIT PACK

DESIG	LOC	CODE
CP1	3A1	ED-99653-32

CONNECTOR

DESIG	LOC	CODE
J1	3A1	KS-16345,L2 (SOCKET)

TERMINAL STRIP

DESIG	LOC	CODE
TB1	3D1	D3A

APP FIG. 6

CIRCUIT PACK

DESIG	LOC	CODE
CP1A	3A1	ED-99653-33

CONNECTOR

DESIG	LOC	CODE
J1	3A1	KS-16345,L2 (SOCKET)

TERMINAL STRIP

DESIG	LOC	CODE
TB1	3D1	D3A

ISSUE 16B

J99329A CONTROL UNIT (60A) CIRCUIT

SD-99331-01-C2

BELL TELEPHONE LABORATORIES INCORPORATED

6S

CIRCUIT NOTES:

101.

DESIG	FUSE AMP	POTENTIAL	ONE PER
		48V TALK	FIG. 1

BATTERY SYMBOL	VOLTAGE RANGE
-48	42.75 TO 52.5

102.

FEATURE OR OPTION	PROVIDE APP FIG.	PROVIDE APP OR WBG	PROVIDE QUANTITY
60A CONTROL UNIT	1,2,4		1 PER CKT
900Ω INPUT AND OUTPUT IMPEDANCES	5		1 PER CKT
600Ω INPUT AND OUTPUT IMPEDANCES	6		1 PER CKT

103.

RECORD OF APP FIGURES, WIRING AND APPARATUS CHANGES								
CHANGED ON ISS	IF JOB RECORDS DO NOT SPECIFY	THIS OPTION WAS FURN	SEE NOTE	USE IN CIRCUIT STD	A&M	MO	
10B	Z OR Y	Z		Y		Z	
11B	X OR W	X		W		X	
15B	V OR U	V		U		V	

104.

NETWORK VALUES		
NETWORK NO.	RESISTANCE IN OHMS	CAPACITANCE IN UF
1	470	0.11

CIRCUIT NOTES: (CONT)

105. PRIOR TO ISSUE 4D, THE 60A CONTROL UNIT WAS CODED APPARATUS. SOME 60A CONTROL UNITS WERE MANUFACTURED WITHOUT NETWORKS(S) AND (T). FOR INSTALLATION IS ESS NO. 1 OFFICE IT SHALL BE NECESSARY TO INSPECT 60A CONTROL UNITS PRIOR TO INSTALLATION FOR NETWORKS AND IF NOT PRESENT TO PROVIDE 1854 NETWORKS AS SHOWN IN FS1.

106. PRIOR TO ISSUE 16B, QUIET TERMINATIONS (R_1,R_2,C1A,C1B) WERE REQUIRED ON THE T RELAY. THESE QUIET TERMINATIONS SHOULD BE REMOVED WHEN UPDATING THE CONTROL UNIT WITH CP1, E0-99653-32 OR CP1A, E0-99653-33.

107. PRIOR TO ISSUE 16B, TERMINALS 17 AND 18 OF TB1 WERE CONNECTED TO THE S RELAY. TERMINALS 17 AND 19 OF TB1 SHOULD BE CONNECTED TO PINS L AND M OF J1 WHEN UPDATING THE CONTROL UNIT WITH CP1, E0-99653-32 OR CP1A, E0-99653-33.

EQUIPMENT NOTES:

201. THE 60A CONTROL UNIT REQUIRES 2 X 23 INCHES OF MOUNTING PLATE SPACE.

202. IN NO. 1 AND NO. 2 ESS OFFICES, THE 60A CONTROL UNIT SHOULD BE MOUNTED ON THE SAME MISCELLANEOUS TRUNK FRAME, AS THE ASSOCIATED COMBINED MILLIWATT AND LOOP AROUND TEST CIRCUIT.

203. IN NO. 1 ESS, THESE LEADS ARE TO BE CONNECTED TO THE REMOTE MASTER SCANNER APPLIQUE CIRCUIT, SD-1A210-01, OR MASTER SCANNER APPLIQUE CIRCUIT, SD-1A133-01. THE SCAN POINT CLASS IS TO BE 'DIRECTED'. REFER TO SD-1A272-01 FOR METHOD OF ASSIGNMENT. IN NO. 2 ESS, THESE LEADS SHOULD BE CONNECTED TO THE REMOTE MASTER SCANNER APPLIQUE CIRCUIT, SD-1A210-01, OR THE MASTER SCANNER APPLIQUE CIRCUIT, SD-1A133-01. SEE SD-2H167-01 SECTION 1, 2, RULE 5B2 FOR THE SCANNER ASSIGNMENT IN THE VARIABLE ALARM.

204.

ISSUE 16B

J99329A CONTROL UNIT (60A) CIRCUIT

SD-99331-01-D1

BELL TELEPHONE LABORATORIES INCORPORATED

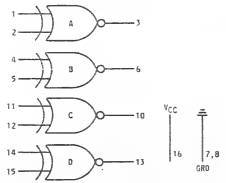
SIZE 6S

INFORMATION NOTES:

301. UNLESS OTHERWISE SPECIFIED:
RESISTANCE VALUES ARE IN OHMS,
K IS FOR KILOHMS,
CAPACITANCE VALUES ARE IN MICROFARADS,
VALUES PRECEDED BY THE SYMBOL+(PLUS)
OR -(MINUS) ARE IN VOLTS.

302. THE TERMINAL NUMBER ASSIGNMENT FOR THE INTEGRATED CIRCUITS ARE AS FOLLOWS:

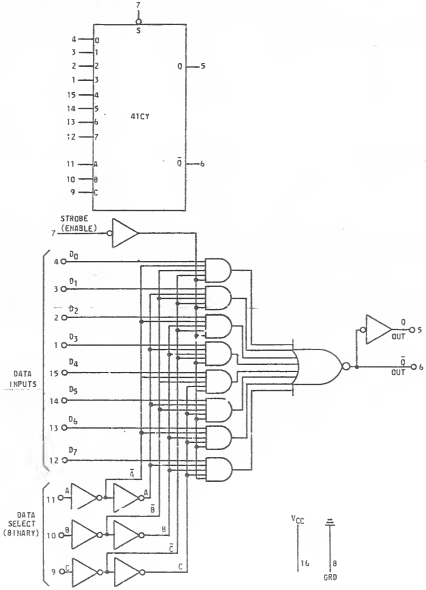
A. 41CT QUAD EXCLUSIVE NOR GATE, 4 PER IC.



INPUT/OUTPUT INFORMATION

INFORMATION NOTES: (CONT)

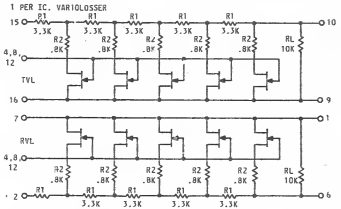
302. B. 41CY 8 LINE DATA SELECTOR/MULTIPLEXER, 1 PER IC.



INPUT/OUTPUT INFORMATION

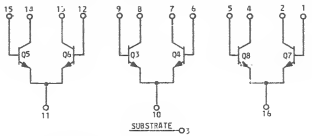
INFORMATION NOTES: (CONT)

302. C. 502L
1 PER IC. VARIOLOSSER



INPUT/OUTPUT INFORMATION

302. D. 502R DIFFERENTIAL TRANSISTOR PAIRS, 3 PER IC.



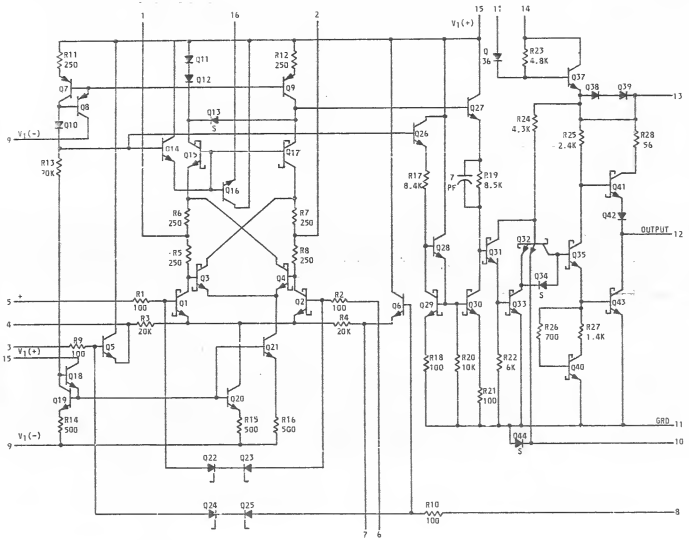
INPUT/OUTPUT INFORMATION

ISSUE 16B

J99329A CONTROL UNIT (60A) CIRCUIT	SD-99331-01-D2
BELL TELEPHONE LABORATORIES INCORPORATED	SIZE 6S

INFORMATION NOTES: (CONT)

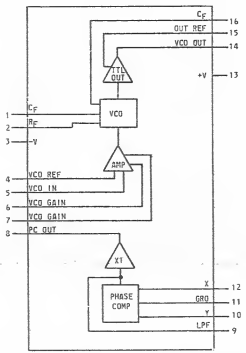
302. E. 5028G HIGH GAIN COMPARATOR.
1 PER IC.



INPUT/OUTPUT INFORMATION

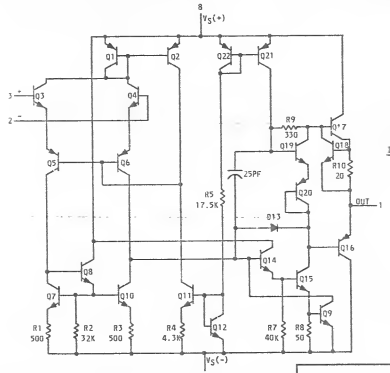
INFORMATION NOTES: (CONT)

302. F. 502EP PHASE-LOCKED LOOP.
1 PER IC.



INPUT/OUTPUT INFORMATION

302. G. 613F OPERATIONAL AMPLIFIER
2 PER IC.



INPUT/OUTPUT INFORMATION

ISSUE 16B

J99329A CONTROL UNIT (60A) CIRCUIT

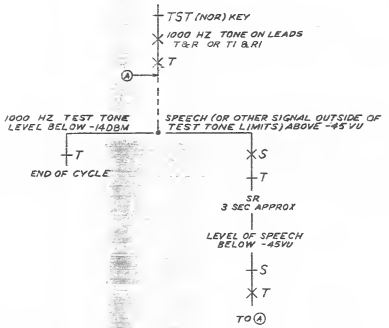
SD-99331-01-03

BELL TELEPHONE LABORATORIES INCORPORATED

DATE ISSUED 6S

PRINTED IN U.S.A.

SC 1 (MFR DISC)
AUTOMATIC CONTROL



ISSUE 16B

J99329A CONTROL UNIT (60A) CIRCUIT

SD-99331-01-E1

BELL TELEPHONE LABORATORIES INCORPORATED

SD-99331-01

CIRCUIT REQUIREMENTS
60A CONTROL UNIT CIRCUIT

APPARATUS DESIG	APPARATUS CODE	APPARATUS OPT.	APPARATUS FIG.	MECH REQT BSP FIG.	MECH REQT CONT PRES	MECH REQT ARM. TRVL.	CIRCUIT PREPARATION BLOCK OR INSULATE	CIRCUIT PREPARATION TEST CLIP DATA CONN BAT.	CIRCUIT PREPARATION TEST CLIP DATA -CONN GRD	TEST SET PREP	SEE TEST NOTE	DIRECT CURRENT FLOW REQT TEST WDG	DIRECT CURRENT FLOW REQT TEST POP	DIRECT CURRENT FLOW REQT AFTER SOAK MA	DIRECT CURRENT FLOW REQT TEST MA	DIRECT CURRENT FLOW REQT READJ MA	REMARKS
RELAY																	
S	1/2 AR33		1	209				1U(S)	2U(S)	NGB	1,2		0		10.9	10.4	MTD WITH (T)
T	1/2 AR33		1	209				1L(T)	2L(T)	NGB	1,2		0		13.2	12.6	MTD WITH (S)

TEST NOTES:

1. DISCONNECT CO BAT. FROM 60A CONTROL UNIT AND REMOVE PRINTED WIRING CARD BEFORE PERFORMING TEST.
2. POLARITY FOR TEST SET CONNECTION: BAT. (-); GRD (+).

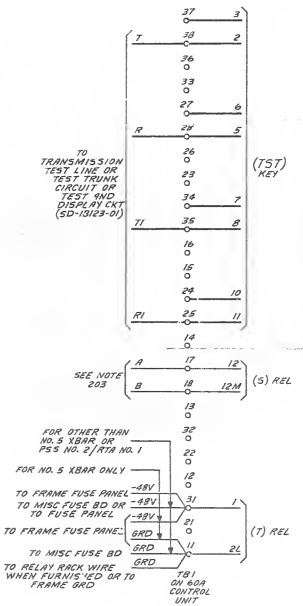
ISSUE 16B

J99329A CONTROL UNIT (60A) CIRCUIT	SD-99331-01-FI
BELL TELEPHONE LABORATORIES INCORPORATED	

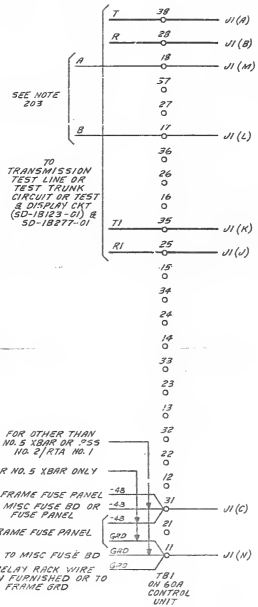
ISSUE 16B

J99329A CONTROL UNIT (60A) CIRCUIT	(2)	SD-99331-01-FI
BELL TELEPHONE LABORATORIES INCORPORATED	SIZE 8S	

CAD 1 (MFR DISC)
(FOR APP FIGS. 1, 3 AND 4)

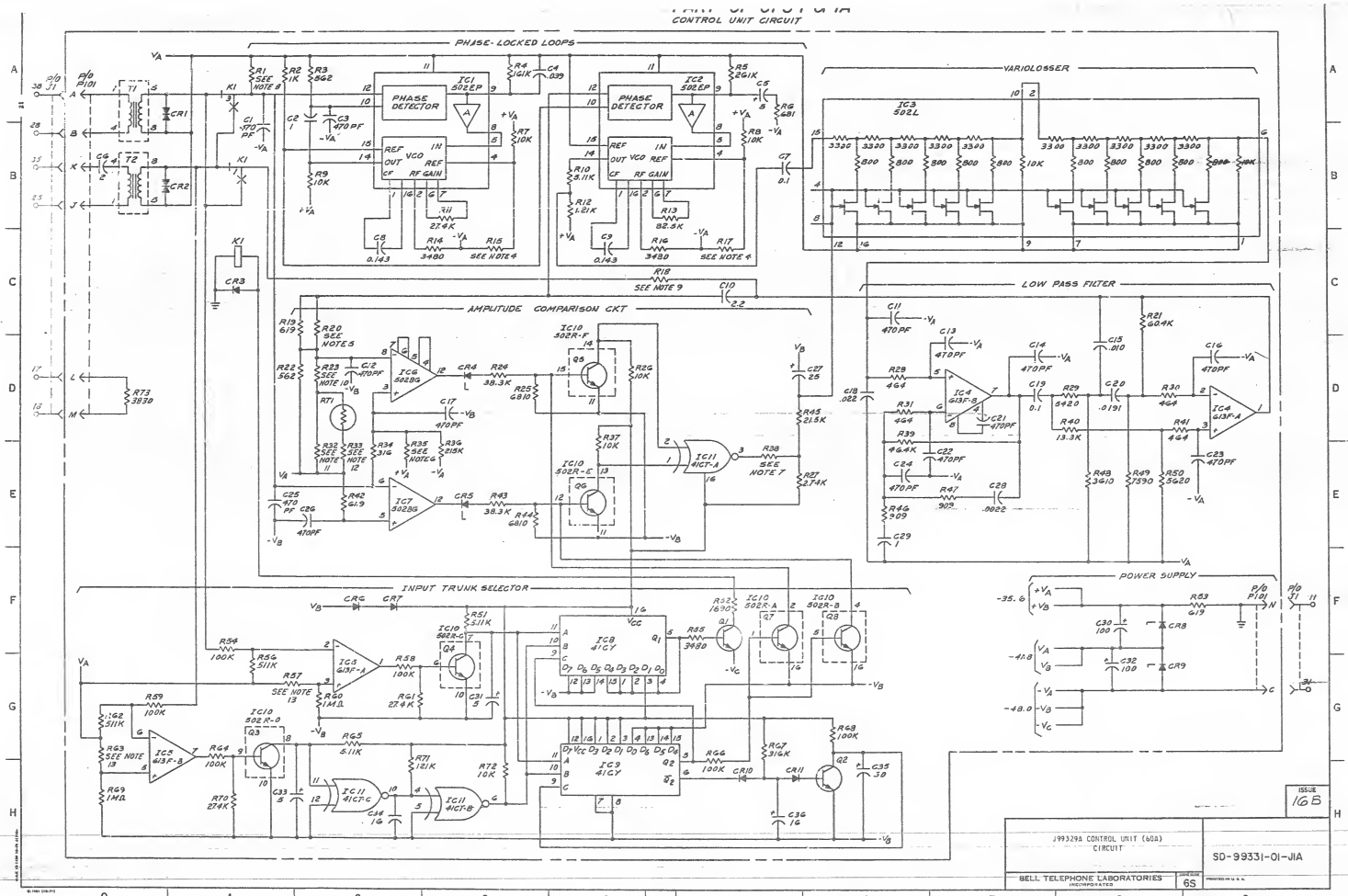


CAD 2
(FOR APP FIG. 5 AND 6)



ISSUE 16B

J99329A CONTROL UNIT (60A) CIRCUIT	SD-99331-01-GI
BELL TELEPHONE LABORATORIES INCORPORATED	DWG SIZE 6S


CONTROL UNIT CIRCUIT
PHASE-LOCKED LOOPS
VARIOLOSSER
AMPLITUDE COMPARISON CKT
LOW PASS FILTER
INPUT TRUNK SELECTOR
POWER SUPPLY
PHASE DETECTOR
IC1 502EP
IC2 502EP
IC3 502L
IC4 G13F-B
IC5 G13F-A
IC6 5028G
IC7 5028G
IC8 41CY
IC9 41CY
IC10 502R-A
IC10 502R-B
IC10 502R-C
IC10 502R-D
IC10 502R-E
IC10 502R-F
IC11 41CT-A
IC11 41CT-B
IC11 41CT-C
IC12 G13F-B
IC13 G13F-A
T1
T2
CR1
CR2
CR3
CR5
CR6
CR7
CR8
CR9
CR10
CR11
K1
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
P/O P101
J99329A CONTROL UNIT (60A) CIRCUIT
BELL TELEPHONE LABORATORIES INCORPORATED
SD-99331-01-JIA
ISSUE 16B
6S

PART OF CPS 1 & 1A

CONTROL UNIT CIRCUIT

COMPONENT LIST

INTEGRATED CIRCUIT

DEV ID	IC1		IC2		IC3		IC4		IC5		IC6	
CODE	502EP*		502EP*		502L *		613F		613F		502BG*	
ELEMT IDENT	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC
A		J1A/A3		J1A/A5		J1A/A6		J1A/D9		J1A/F2		J1A/G2
B								J1A/D7		J1A/G6		
C												
D												
E												
F												
G												

* SINGLE ELEMENT DEVICE

INTEGRATED CIRCUIT

DEV ID	IC7		IC8		IC9		IC10		IC11			
CODE	502BG*		41CY*		41CY*		502B		41CT			
ELEMT IDENT	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC	DESIG	LOC
A		J1A/E2		J1A/F4		J1A/H4		J1A/F5		J1A/D5		
B								J1A/F6		J1A/H3		
C								J1A/F3		J1A/H2		
D								J1A/G1	SPARE			
E								J1A/E4				
F								J1A/C4				
G												

* SINGLE ELEMENT DEVICE

RELAY

DESIG	K1		
CODE	745A		
OPTION			
	CONT ARR	LOC	CONT ARR	LOC
4	EBM			
3	EBM	J1A/B8		
2	EBM			
1	EBM	J1A/B6		
COIL		J1A/C9		

CAPACITOR

DESIG	CODE
C1	KS-19774,L2, 470PF
C2	KS-20736,L1, 1
C3	KS-19774,L2, 470PF
C4	KS-20300,L1, .039
C5	601A, 5
C6	542AG, 2
C7	KS-20300,L3, 0.1
C8	535NY, 0.143
C9	535NY, 0.143
C10	KS-19774,L9, 2.2
C11	KS-19774,L2, 470PF
C12	KS-19774,L2, 470PF
C13	KS-19774,L2, 470PF
C14	KS-19774,L2, 470PF
C15	535HP, .010
C16	KS-19774,L2, 470PF
C17	KS-19774,L2, 470PF
C18	KS-20300,L2, .022
C19	KS-20300,L3, 0.1
C20	735KG, .0191
C21	KS-19774,L2, 470PF
C22	KS-19774,L2, 470PF
C23	KS-19774,L2, 470PF
C24	KS-19774,L2, 470PF
C25	KS-19774,L2, 470PF
C26	KS-19774,L2, 470PF
C27	601C, 25
C28	KS-20300,L1, .0022

CAPACITOR (CONT)

DESIG	CODE
C29	600A, 1
C30	602B, 100
C31	600B, 5
C32	602B, 100
C33	600B, 5
C34	603B, 16
C35	604B, 50
C36	603B, 16

CONNECTOR

DESIG	CODE
P101	KS-16345,L1,(PLUG)

DIODE

DESIG	CODE
CR1	521A
CR2	521A
CR3	533G
CR4	808B
CR5	808B
CR6	533G
CR7	533B
CR8	808B
CR9	808B
CR10	458C
CR11	458C

RESISTOR

DESIG	CODE
R1	KS-20616,L1A,SEE NOTE 8
R2	KS-20616,L1A, 1K
R3	KS-20616,L1A, 562
R4	KS-20616,L1A, 261K
R5	KS-20616,L1A, 261K
R6	KS-20616,L1A, 681
R7	KS-20616,L1A, 10K
R8	KS-20616,L1A, 10K
R9	KS-20616,L1A, 10K
R10	KS-20616,L1A, 5.11K
R11	KS-20616,L1A, 27.4K
R12	KS-20616,L1A, 1.21K
R13	KS-20616,L1A, 82.5K
R14	257A, 3480
R15	KS-20616,L1A, SEE NOTE 4
R16	257A, 3480
R17	KS-20616,L1A, SEE NOTE 4
R18	KS-20616,L1A, SEE NOTE 9
R19	KS-16311,L50, 60A
R20	KS-20616,L1A, SEE NOTE 5
R21	KS-20616,L1A, 60.4K
R22	KS-16311,L50, 562
R23	KS-20616,L1A, SEE NOTE 10
R24	KS-20616,L1A, 38.3K
R25	KS-20616,L1A, 681Ω
R26	KS-20616,L1A, 10K
R27	KS-20616,L1A, 2.74K
R28	KS-20616,L1A, 464
R29	KS-20616,L1A, 5420
R30	KS-20616,L1A, 464
R31	KS-20616,L1A, 464
R32	KS-20616,L1A, SEE NOTE 11
R33	KS-20616,L1A, SEE NOTE 12
R34	KS-20616,L1A, 316
R35	KS-20616,L1A, SEE NOTE 6
R36	KS-20616,L1A, 215K
R37	KS-20616,L1A, 10K
R38	KS-20616,L1A, SEE NOTE 7
R39	KS-20616,L1A, 46.4K
R40	KS-20616,L1A, 13.3K
R41	KS-20616,L1A, 464
R42	KS-20616,L1A, 51.9
R43	KS-20616,L1A, 38.3K
R44	KS-20616,L1A, 8810

COMPONENT LIST (CONT)

RESISTOR (CONT)

DESIG	CODE
R45	KS-20616,L1A, 21.5K
R46	KS-20616,L1A, 909
R47	KS-20616,L1A, 909
R48	KS-20616,L1A, 3610
R49	KS-20616,L1A, 7590
R50	KS-20616,L1A, 5620
R51	KS-20616,L1A, 5.11K
R52	KS-20289,L6C, 1690
R53	KS-14603,L14, 619
R54	KS-20616,L1A, 100K
R55	KS-20616,L1A, 3480
R56	KS-20616,L1A, 511K
R57	KS-20616,L1A, 27.4K
R58	KS-20616,L1A, 100K
R59	KS-20616,L1A, 100K
R60	KS-20616,L1A, 1MΩ
R61	KS-20616,L1A, 27.4K
R62	KS-20616,L1A, 511K
R63	KS-20616,L1A, 27.4K
R64	KS-20616,L1A, 100K
R65	KS-20616,L1A, 5.11K
R66	KS-20616,L1A, 100K
R67	KS-20616,L1A, 316Ω
R68	KS-20616,L1A, 100K
R69	KS-20616,L1A, 1MΩ
R70	KS-20616,L1A, 27.4K
R71	KS-20616,L1A, 121K
R72	KS-20616,L1A, 10K
R73	KS-20289,L6C, 3830

THERMISTOR

DESIG	CODE
RT1	17A

TRANSFORMER

DESIG	CODE
T1	256AN
T2	256AN

TRANSISTOR

DESIG	CODE
Q1	66C
Q2	66C

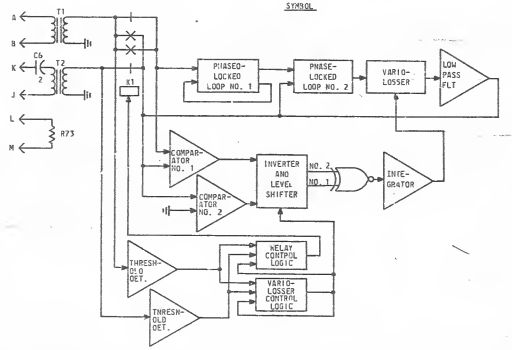
NOTES: (CONT)

4. SELECTED VALUES FOR R15 AND R17:
   31.6K, 24.6K, 19.6K, 15.8K, 13.0K, 10.7K, 8.76K, 7.15K, 5.83K, 4.70K, 3.74K.
5. SELECTED VALUES FOR R20:
   31.6K, 21.5K, 16.2K, 13.0K, 11K, 9.31K, 8.25K, 7.15K, 6.49K, 5.90K, 5.36K, 4.87K.
6. SELECTED VALUES FOR R35:
   126K, 140K, 158K, 182K, 215K, 261K, 332K, 464K, 750K.
7. SELECTED VALUES FOR R38:
   18.7K, 10.5K, 7.15K, 4.87K, 3.65K, 2.61K, 1.96K, 1.40K, 953, 619Ω.
8. FOR CP1 R1 = 876
   FOR CP1A R1 = 536.
9. FOR CP1 R18 = 878
   FOR CP1A R18 = 530.
10. FOR CP1 R23 = 931
    FOR CP1A R23 = 634.
11. FOR CP1 R32 = 505
    FOR CP1A R32 = 649.
12. FOR CP1 R33 = 56.9
    FOR CP1A R33 = 252.
13. FOR CP1 R57 AND R63 = 24.9K
    FOR CP1A R57 AND R63 = 10.7K.

MANUFACTURING REFERENCES

CATEGORY	NO.
CIRCUIT PACK CODE	CP1 CP1A
CONNECTOR ON FRAME	NONE

SYMBOL



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   RESISTANCE VALUES ARE IN OHMS,
   K IS FOR KILOHMS,
   CAPACITANCE VALUES ARE IN MICROFARADS,
   VALUES PRECEDED BY THE SYMBOL + (PLUS) OR - (MINUS) ARE IN VOLTS.
2. ⏚ GROUND RETURN.
3. BATTERY AND GROUND TERMINATIONS FOR IC'S:

DESIG	$-V_A$ TERM.	$-V_B$ TERM.	V_A TERM.	V_B TERM.	$+V_B$ TERM.	$+V_E$ TERM.
IC1	3		11		13	
IC2	3		11,15		13	
IC3			1,7, 9,16			
IC4	4				8	
IC5		4				8
IC6		9		11		13,15
IC7		9		11		13,15
IC8		7,8,12, 13,14				
IC9		4,7,8, 13,14,15				
IC10		9,10, 11,16				
IC11		5,7,8, 12				

ISSUE 16B

J993794 CONTROL UNIT (60A) CIRCUIT

30-99331-01-J1B

BELL TELEPHONE LABORATORIES INCORPORATED

DRN. SIZE 6S